

# THE EFFECTS OF RIPENING TEMPERATURE ON SOME PROPERTIES OF TURKISH DRY-FERMENTED SAUSAGE (SUCUK)

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## Introduction

Turkish dry-fermented sausage, which is called sucuk, is one of the most popular traditional meat products in Turkey. To obtain sucuk dough, minced beef and fat are mixed with curing ingredients and spices, then sucuk dough is filled into natural or artificial casings. Sucuk is produced in two stages; the first stage is the fermentation either by added starter culture or natural flora (Bozkurt and Erkmen, 2002). The second stage is drying of the sucuks under controlled conditions. The combination of fermentation and drying stages is known as the ripening period. Ripening conditions should be strictly controlled to prepare good quality product (Bozkurt and Erkmen, 2004; Bozkurt and Bayram, 2006). Gökalp (1986) concluded that starter culture addition and ripening at high temperatures resulted in faster drying. The objective of this study was to examine the effects of different ripening temperatures on some physical and chemical properties of sucuk.

## Materials and Methods

Fresh boneless beef cuts (80%) and beef fat (20%) were used as a raw material. The following ingredients were added per kg of meat mixture, 27.5g spices, 10g garlic, 28g curing ingredients and 0.5g lyophilised starter culture mixture (*Staphylococcus xylosus*+*Pediococcus acidilactici*). Fat and meat are separately ground then mixed with the ingredients. Sucuk dough was stuffed into collagen casings. Cylindrical rod shaped sucuks which had a length of 40cm and a diameter of 4cm were ripened in a laboratory scale incubator at a constant air velocity (0.5 m/s) and at four different air temperatures (15 (S15), 20 (S20) 25 (S25) and 30°C (S30) for 7 days. Average RH of the air inside the drying chamber varied and was between 65% and 85%. At 0, 1, 2, 3, 4, 5, 6 and 7 days, moisture content (AOAC,2000), pH (Landvogt, 1991) and colour (CIE, 1986) was measured.

## Results and Discussion

Changes in the pH values of sucuk samples during ripening are given in Figure 1. The initial pH of sucuk samples ranged from 5.5 to 5.6 and the final pH varied from 5.4 to 4.4. The pH values of sucuk samples were significantly affected by ripening temperature. Similar results in sucuks were reported by Soyer *et al.* (2005). There was a rapid decrease in pH at 25 and 30°C. A sharp decrease was observed in samples ripened at 20, 25 and 30°C on the second day of ripening. These results were in agreement with the literature that pH values of sucuk samples decreased sharply during the first days of ripening due to the production of lactic acid (Kayaardı and Gök, 2003, Bozkurt and Bayram, 2006).

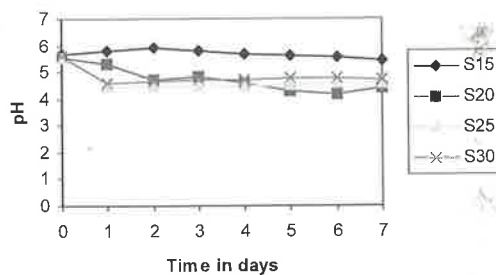


Figure 1: Effect of ripening temperature on pH values of sucuks.

Figure 2 shows the moisture changes of sucuk samples. During the drying period, the moisture content decreased as a result of the moisture loss at high ripening temperatures. At day 0, moisture contents of S15, S20, S25 and S30 samples were 65.8, 59.5, 63.2 and 63.2 respectively. Due to slow dehydration at a lower temperature, sucuk samples ripened at 15°C had higher moisture content than those ripened at 20, 25 and 30°C by day 7. Faster pH decline could be the reason for rapid moisture movement in sucuk samples. Gökalp (1986) concluded that ripening at higher temperatures resulted in faster drying. Similar results were reported by Soyer *et al.* (2004) who indicated that moisture decreased slowly at low ripening temperatures.

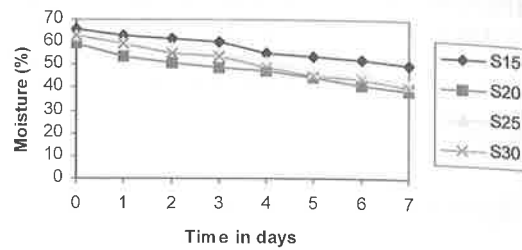


Figure 2: Effect of ripening temperature on moisture changes in sucuk samples.

Table 1: Colour values (L,a,b) of sucuk samples at day 0 and day 7.

	L*	a*	b*
<i>0 Day</i>			
S15	41,3	15,2	19,6
S20	42,2	17,2	20,5
S25	41,0	16,8	21,7
S30	41,6	15,1	19,0
P	NS	NS	NS
<i>7<sup>th</sup> Day</i>			
S15	38,1a	13,0	15,2b
S20	46,3c	14,3	16,1b
S25	45,4bc	13,9	16,1b
S30	42,8ab	12,0	13,6a
P	0,018	NS	0,032

(a-c) Different letters in the same column indicate significant differences. NS: Non significant, P: Significance

The L\*a\* and b\* values of treatment groups were not significantly different from each other at day 0 of ripening (Table 1). On the 7<sup>th</sup> day of ripening there was an increase in L\* values for the treatment groups except for the S15 group. S15 samples had lower L\* values than other treatment groups on the 7<sup>th</sup> day of ripening. Similarly Bozkurt and Bayram (2006) found that L\* values of sucuk samples increased in the early ripening period. No differences were found in a\* values of sucuk samples. S30 group had lower b\* values (less yellow colour) than other treatment groups. The possible reason for lower b\* values in S30 samples might be a partial denaturation of nitrosomyoglobin because of the higher levels of lactic acid in those samples.

#### Conclusion

Ripening of Turkish dry-fermented sausage (sucuk) at high ripening temperatures resulted in rapid pH decline and rapid drying. Further research should focus on investigating the effects of high ripening temperatures on the sensory properties of sucuk.

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